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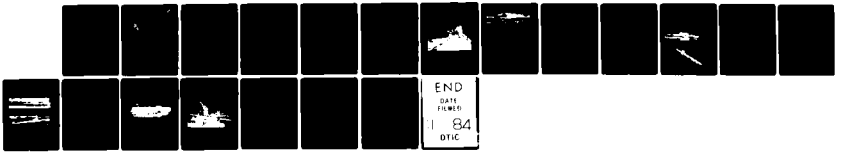

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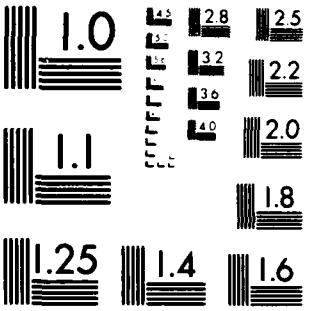

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TRANSLATION

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AUTHOR: SIEGFRIED BREYER

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Soviet Submarines As Carriers of Missile Systems (SSGN)

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Our regular collaborator for the Soviet and Warsaw Pact navies describes the development of the Soviet missile submarines from the WHISKEY SINGLE CYLINDER test platform to the current OSCAR Class in this article

The documentation of the largest SSGN* in the world makes it appropriate to attempt to analyze a development, which was initiated

*The size of this type of warships suggests that the standard term "submarine" be discarded and that instead the term "submarine ship" be used. This problem of terminology does not apply in English, because the term "submarine" is specific.

a quarter of a century ago and which could from modest beginnings grow into one of the most potent naval weapon systems. The issue is the Soviet guided missile submarines, whose development has reached a new climax with the OSCAR Class, which has just become operational*.

* The first photo of an OSCAR Class SSGN was published in the latest Pentagon Paper "Soviet Military Power", Second Edition, March 1983.

Frequently the Soviet cruise missile attack submarines are assigned exclusively an anti-ship role. Currently this is indeed the case, but this was not always so. Apparently it appears even today to be generally unknown that this tactical anti-ship role was actually preceded by the concept of an early strategic nuclear weapon system. A look at the post-war years makes it apparent how the East-West power confrontation was at that time:

- On the one side the Western Allies, certainly with largely demobilized land forces but still with strong naval forces (at that time the strongest naval forces in the world), and in particular the West (USA) had the monopoly of the atomic bomb, which at that time was imagined to be capable of preventing any further war (which of course contained the germs of the own politics of hegemony).
- On the other side there was the Soviet Union, whose Red Army still had its war-time strength and occupied the greater part of the Eurasian land mass - from the shores of the Pacific to the Elbe, but the Soviet Navy, which had been very decimated in WWII was overshadowed by the army, and the navy was accorded only a minor role in the victory over the enemies of the Soviet Union; however, the major handicap of the Soviet Navy was tnat it had no arsenal of atomic weapons, because the Soviets had not yet developed the production techniques.

The expansion of the Soviet sphere of power and influence which began after WWII brought the West progressively more into conflict with the Soviet Union, which did not want any accommodation, and indeed did everything it could to keep the conflict smoldering. From today's perspective it is progressively more apparent why the Soviet Union did not have to subscribe to such an accommodation: In August 1949 the Soviets detonated their first atomic bomb (their first hydrogen bomb followed three years later). With this they had realized their entry

* Numbers in the right margin indicate pagination in the original text.

into the era of atomic weapons and were now capable of presenting a nuclear response to the West, specifically to the USA. In the following period they were therefore even less inclined to change or even to moderate their power politics, and moreover they aggravated the situation wherever they could - the "Cold War" had begun. /413

MISSILES AS STRATEGIC WEAPON SYSTEMS

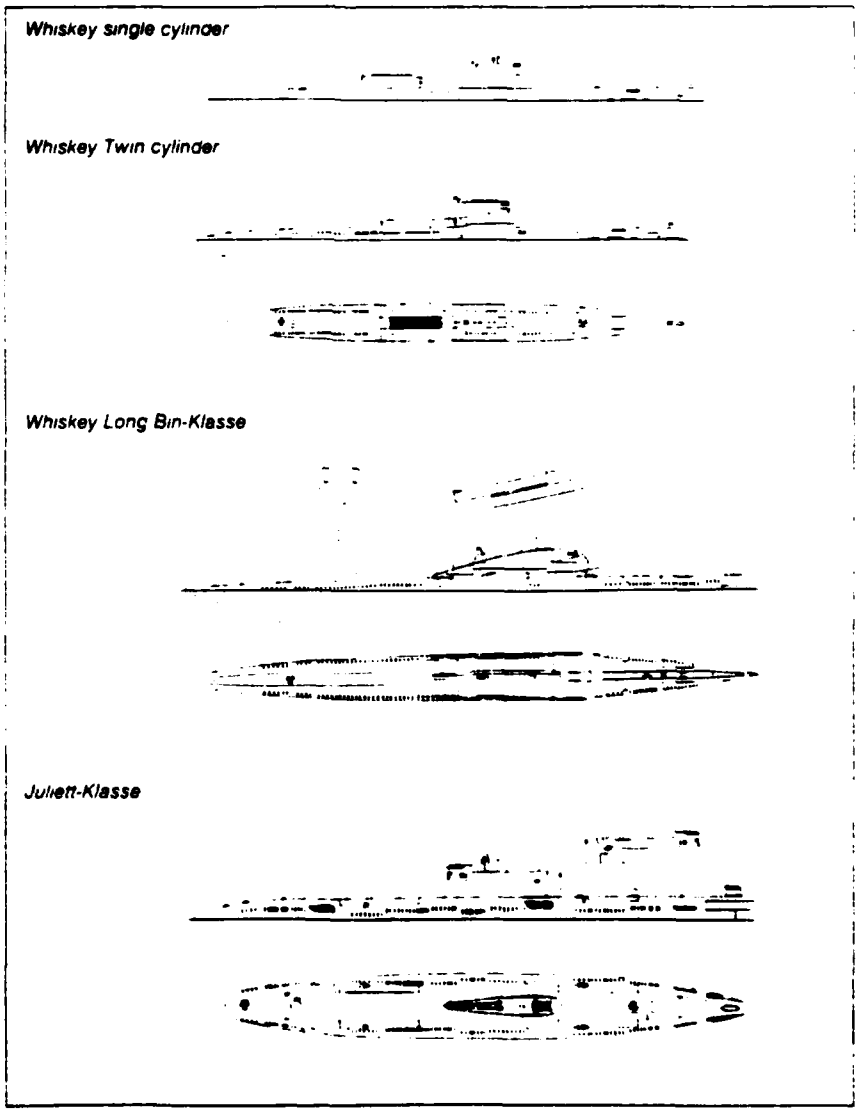
The Soviets had not only broken the Western-American atomic weapon monopoly, but already in 1947 they had initiated a large fleet expansion program, which provided the Soviet Navy with a considerable increase in surface ships, submarines and naval aviation. With this they were intended to provide for the defense of Soviet coastal waters, because from the Soviet perspective there appeared to be a definite amphibious threat from their former Western allies. Therefore this expansion program could be regarded as being definitely defensive in nature; the development of offensive naval forces was assigned only a low order of priority; this was essentially restricted to the construction of a very limited number of long-range submarines. However, during this period a very extensive reduction of the Western fleet inventories occurred, and particularly a reduction of the amphibious forces (which were then lacking so extensively in the Korean War!), so that for the Soviets the impetus for their large fleet expansion program was actually eliminated. They appear to have noticed this fact at a considerably later date. When they then made this perception, they coincidentally had to realize that the naval threat had begun to change and the strategic-nuclear threat was beginning to be expanded. With all of the reduction of its naval forces, the USA retained its aircraft carriers and exploited them in the context of the announced "massive retaliation" by locating a part of their strategic-nuclear potential in the carriers. At that time, in addition to the land-based intercontinental bombers, only carrier aircraft were capable of reaching targets (these were almost exclusively peripheral targets) in the Soviet sphere of influence with atomic bombs, because the development of ICBM was still at a very early stage. Therefore only manned aircraft could be considered as the carriers for atomic bombs. This applied in the same way for the Soviets, however in this regard the Soviets experienced major difficulties in developing such carrier systems: The range of their bombers was insufficient to reach any targets in the United States. Since the Soviets also had no aircraft carriers and since at that time they were scarcely capable both technologically and industrially of building such complex capital ships, they had to find other alternatives for developing a strategic-nuclear capability which would be taken seriously by the West.

The combination "submarine/missile" promised to provide a solution among the immediate possibilities and to realize the objective. This concept was certainly convenient for a development, which was intended for the Soviet land forces; in the second half of the 1950's a new heavy tactical missile system was developed. which was designated as SHADDOCK in NATO, and which was later assigned the NATO type code SSC1A/B and the code name SEPAL*.

* Jane's Weapon Systems 1981-82, Londond 1981, p. 51 ff. (only SSC-1B is listed there, apparently because SSC-1A has been eliminated from the inventory).

The naval coastal defense battalions were equipped with this missile system (each battalion had 15 to 18 SEPAL missiles as its total load); these battalions were tasked with the defense of the approaches which led to major harbors and naval bases. /414

On the basis of this weapon system after 1958 the SS-N-3C (SHADDOCK non-homing) was developed. This missile can carry a 350-KT nuclear warhead to a maximum range of 250 sm, i.e. approximately 460 km. This meant that a submarine equipped with this missile would have to approach so close to a hostile coast that it was be in imminent danger of being detected, particularly since it could fire its missiles only surfaced (it did not have to stop to fire, but could maintain a speed of ca. 10 kn, but this made not difference in detection from the air). Fast detection as a rule resulted in almost immediate countermeasures, primarily from the air, and the submarine could escape from such countermeasures only with considerable difficulty if at all. A submarine which got into such a situation would have had to have extraordinarily good luck to survive at all. The Soviets appear however to have accepted this possibility; one successful nuclear attack would certainly have justified the loss of the submarine - another form of "fire and forget".



The start of these SS-N-3C missiles was effected by means of two /414
solid rocket engines as boosters; these engines were jettisoned automatically after burn-out. The guidance to the pre-programmed target was presumably provided by an inertial guidance system without the assistance of other techniques. Target accuracy was between 3,500 and 5,000 meters.

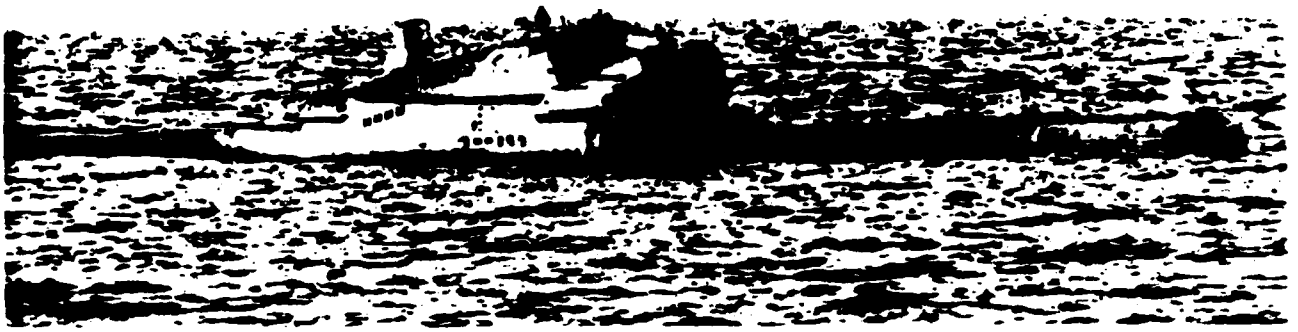
Of course, this system combination could only have validity as long as other carrier weapons were not yet- available. When they succeeded in developing operational medium-range and intercontinental ballistic missiles in the 1960's, the submarine/missile combination immediately lost its validity.

STRATEGIC MISSILES ON SUBMARINES

The first guided missile submarines were built by modifying available units of the WHISKEY Class. These projects were completed in two intervals: in 1956-57 in the Black Sea region a single submarine was modified in 1960-1961 in the Northern region an additional five submarines were converted. For both versions missile containers were provided outside of the pressure hull, which themselves had to be built pressure-resistant. The first submarine was used only as a test platform and had only one missile container installed, which was located an a considerable distance behind the conning tower on the deck; correspondingly this submarine was assigned the NATO code designation WHISKEY SINGLE CYLINDER Class. The missile container was dimensioned exactly to the length of the SS-N-3C, but had such a large diameter, that it has to remain unresolved whether or not - as as since been assumed - it had to be elevated to a particular position for firing. It would rather appear to be the case, but that the start was performed with a small angled ramp enclosed in the container, for which purpose the terminating covers on both sides would have to be opened. From the current perspective it would appear that this submarine was used primarily for "navalizing" the SSC-1B into the SS-N-3C, while the following submarines were used for testing the containers, the starting technique and the control procedure. These submarines were subjected to a considerably more extensive degree of modification than the first submarine, because they had the facilities for two SS-N-3C missiles installed, which conisisted of two cylindrical containers mounted parallel to each other on a common ramp. These containers were considerably more narrow than that on thw WHISKEY SINGLE CYLINDER submarine; their length was 14.6 m and the diameter was 1.7 m (for comparison the data of the SINGLE CYLINDER submarine: 11.2 m and 2.9 m). This was possible because their common ramp could be elevated, while this was not possible with the SINGLE CYLINDER type, as has been noted above. Coincidentally with the installation of this container group the deck step following the tower sail) was removed. To protect the container again sea damage, a wavebreaker was installed, which apparently also acted as a blast deflector. This wavebreaker goes from immediately in front of the tower and extends to its rear edge on both sides. Of these first two Soviet missile submarines only two still survive today and these belong to the WHISKEY TWIN CYLINDER Class; they are apparently used as training units. The SINGLE CYLINDER submarine would probably have been discarded rather early - probably in the 1960's - or might have been converted back to the standard WHISKEY configuration.

In 1959 at the Baltic Shipyard in Leningrad the first submarine type intended for strategic-nuclear operations was laid down. Apparently incomplete WHISKEY hulls had been used for the purpose (the WHISKET program was terminated in the mid-1950's). Most probably the hulls were cut in the center and an additional section was added with a new tower (sail), because of which the LOA was increased by 6.4 meters. Inside the sail (tower) in lateral position two each pressurized missile containers were installed, which were longitudinally offset at an angle of approximately 15 degrees; their terminating covers were closed by flaps. The exhaust blast is diverted aft through openings which are unmasked after the rear lateral sail (tower) casings are raised. For reasons of stability these submarines were provided with a ballast keel approximately 60 meters long. These submarines were compieted after 1961.

The effort of the Soviety Navy to develop a sea-based strategic-nuclear capabaility was initially prosecuted on two parallel tracks: On the one hand a ballistic rocket was developed already in the 1950's which could launched from submarines, and on the other hand missiles which had been developed for land use were utilized for submarine operation; these missiles were initially launched on a test basis from provisionally modified submarines of the WHISKEY TWO CYLINDER Class (above), until the better aerodynamic installation on the WHISKEY LONG BIN Class was developed (below). These submarines used the SS-N-3C with 350-KT warhead with a range of 250 sm, which were intended primarily for use against NATO harbors and bases.



In the interim Soviet missile development was prosecuted vigorously (in this regard the launch of SPUTNIK satellites in 1957 shocked the West), so that the cruise missile submarines designated in NATO as the WHISKEY LONG BIN Class practically became obsolete, before they became operational. Therefore this program - which according to the original schedule was to have 72 units - was terminated prematurely* 415

* MccGwire: The Background of The Soviet Naval Policy in: Marine-Rundschau 5/69, p. 321. and only those units which had been started were completed, a total of seven units.

Only shortly after the start of the WHISKEY LONG BIN program in Komsomolsk in the Far East a series of five larger submarines was laid down, which were also equipped with the SS-N-3C. They also had missile containers installed outside of the pressure hull, but as differentiated from the types built to date, these were no longer on the upper deck, but between the pressure hull and the outer hull; these containers were paired and could be elevated approximately 15 degrees in the forward direction for launching. The front pair of container flanked the tower (sail) and the two other containers followed close together at a rather larger interval. Behind each one the outer hull had an indentation, which was configured in such a manner, so that it directed the blast of the starting missile to the outside, where it was dissipated without causing any damage.

On the basis of their dimensions, their size and the propulsion system this Class, which is designated in NATO as ECHO-I shows considerable similarities both with the HOTEL-I and NOVEMBER Class, which both are the first generation of Soviet nuclear submarines. It is therefore not regarded as being unlikely that these are units which were derived from the HOTEL-I Class at an early stage of construction, because delays could be noted in this Class. The delivery of the ECHO-I Class began in 1961 and was completed in 1963. In their SSGN configuration they were observed only very rarely; very few photos of them are available to date. Apparently they have always been stationed with the Pacific Fleet and never or only very rarely have emerged from coastal waters there. It is very probable that they had major problems with their reactors and/or propulsion systems, which often put them into shipyard for repairs. Beginning from 1971, they were converted to attack submarines - apparently at a Far East shipyard - i.e., the missile system which had become superfluous was removed and the torpedo armament - which originally had consisted of only two bow tubes - was increased. This conversion program could be completed by 1974; since that time these five units have been listed with the NATO SSN type [illegible] ECHO Class. One of these units

Okinawa; it was then noted that there had been an internal fire, which /41 caused the death of six or eight crew members. The damaged submarine could be brought to Vladivostok by a towboat, and since that time nothing has been heard of this submarine. To date is is not known whether the submarine could be repaired or whether it had to be discarded as being non-repairable.

Actually, the history of these first Soviet submarines which were designed for nuclear-strategic operation ended before it had really begun. Even if the five units of the ECHO-I Class were left in this configuration until the beginning of the 1970's and there are still three WHISKEY LONG BIN units in operation, this does not change this estimate. The units which were completed bever had strategic importance; at best they were used for training purposes, and are still being used for training purposes, insofar as the LONG BIN units are concerned.

MISSILES OF THE ANTI-CARRIER TYPE

In order to be able to continue at the interface of the further development, here is an historical flashback: Initially the Soviets had nothing to counter the utilization of the American carrier battle group with its nuclear-strategic capability, as mentioned previously. Certainly they were rather discomfitted to note that the numerous units which they had commissioned since the end of WWII were as good as useless for countering this new naval threat; the only exception was their submarines, but because of their type-associated deficiencies - particularly because of their inadequate speed and because of their restricted operational radius (which was particularly emphasized by the original unfavourable geographical sea situation), they could be used for the purpose only on a limited basis. This perception must have been a considerable shock for the Soviet leadership; therefore a completely new concept of the naval construction program was developed, which from now on was predicated upon combatting the carrier battle groups. However, in this regard, first problems of the most various types had to be solved: certainly the major problem was to overcome the far-reaching covering surveillance and defensive capability which the carrier battle group has. In this regard to idea to to attack the carrier battle groups before they could launch their aircraft for nuclear attacks on the assigned land targets. However, none of the naval warfare means available at this time was suitable for the purpose, neither the torpedo nor the mine, and certainly not conventional tube artillery. The only available route was the eventual d evelopment of missiles: an unmanned missile could not only be launched against a target at a much greater range, but it could be used to carry both a conventional and a nuclear warhead. In this situation the extensive documentation and equipment, which had given them information on German missile development until 1945, must have been of considerable value to them; in addition, they utilized German scientists and rocket technicians, whom they forced to collaborate. In regard to this development status soon after WWII a missile was built which corresponded to the German VI - this was the J1 which was first operational in 1948. This then became the point of departure for further development on the basis of which the improved models J2 and J3 were produced, which were operational respectively in 1954 and 1955*.

* The J1, which was 9 m long and had a starting weight of 4,500 kg, had a range of 550 km, an altitude of 7,000 m and a velocity of 700 km/h. The J2 had a length of 11 m and a starting weight of 7.300 kg, a range of 800 km and reach 1,000 km/h). The J3, which was also 11 m long

had a starting weight of 8,500 kg, a range of 750 km, an altitude of /418
16,000 meters and reached 1,400 km/h (all data from: Brock: Taschenbuch der Flugkörper, Raketen, Satelliten (Handbook of Missiles, Rockets and Satellites), München 1963).

In the period thereafter the Soviets suceeeded, probably on the basis of this development series, in developing and making operational missile weapon systems which were suitable for use on surface ships; these were the SS-N-1 (SCRUBBER) and the SS-N-2 (STYX); the first of these was suitable for cruisers and destroyers, the latter for smaller units. Both models were aerodynamic missiles and looked like small unmanned aircraft. Because of their bulky design - this was particularly noticeable in the SS-N-1 - these missiles could not be used in submarines; the fixed wings and the complex and extensive launching sequence prevent use in submarines.

In the interim, the Soviet Navy had adapted the originally land-based SHADDOCK as a strategic-nuclear ship/land missile for installation in submarines, as as been illustrated within the parameteters of this article. Therefore, this design seemed to be basically suitable as a ship-to-ship weapon system. Therefore, two versions were developed, of which the one - the SS-N-3 B (also designated as SHADDOCK VARIANT) was intended as the successor of the SS-N-2 for large surface units, while the other, however - the SS-N-3A (SHADDOCK ANTi-SHIP) - was designed for submarines.

The guidance of the SS-N-3A missiles was effected on the one hand by a pre-programmed autopilot and additionally by a radio control technique. In the final flight phase an active homing head appears to operate, which directs the missile against the target. The missile can be employed up to a speed of 15 kn and a sea state 6.

Certainly the SS-N-3A missiles had several operating parameters which were better as compared to the SS-N-1, but on the other hand /419
they were considerably larger and heavier. In this regard however it was evidenced as being advantageous for them that they had a considerably smaller wingspan, because their wings had been cropped to the size of stabilizers and could be folded in the launch containers. This again made it possible to insert them in a pressurized and therefore necessarily cylindrical container from which they could start.

On the other hand, this weapon system had deficiencies because of which its carrier was subjected to a considerable degree of hazard; on the one hand this missile could be launched only with the submarine surfaced and on the other hand the submarine had to remain on the surface for a very long time in order to be able to to make required course corrections by radio control. During this period of time it was exposed to possible detection by the enemy; particularly in regard to operation against a carrier battle group the danger is extraordinarily large, because as known carrier aircraft are continuously in the air and provide long-range screening for the carrier battle group.

ANTI-CARRIER CRUISE MISSILE SUBMARINES (SSGN)

The first submarine type equipped with the SS-N-3A missile weapon system was the JULIETT Class begun in 1961, which was built in Gorki. It design goes bavk to 1957/58; the fact that it was design for a conventional propulsion system was apparently due to the requirement to provide a missile-equipped submarine as quickly as possible, because the development of reactors for nuclear propulsion systems was probably still experiencing some difficulties at this time; the first nuclear submarine - one of the NOVEMBER Class - became operational first only in 1959.

The installation of the SS-N-3A was effected in the JULIETT Class /419 on the model of the ECHO-I Class with elevating twin container groups, one each before and after the sail with the typical indentations of the outer hull as blast deflectors. In the front section of the sail a combination of radar systems was installed; these were each one FRONT DOOR and one FRONT PIECE radar, both of which were assigned to the SS-N-3A weapon system, apparently as missile tracking and target tracking systems. In order for the larger of the two radars - the FRONT DOOR (it has a height of ca. 2.4 meters and a width of ca. 1.3 meters) - to be able to perform its function at all, the front section of the sail (tower) has to be turned in such a manner (approximately 180 degrees), so that they are released: FRONT DOOR folds to the front in the process and FRONT PIECE is turned upwards. In some submarines the sail (tower) is modified to such an extent that bulges are installed on both sides. These correspond approximately to those on the YANKEE-I Class and might be used to accommodate electronic equipment which has not yet been identified.

One of the conventional cruise missile submarines (SSGN) of the JULIETT Class which was built after 1962. The start tubes for the SHADDOCK missiles are installed in the upper-deck casing. The exhaust openings for the blast gases can be noted. Launch can be performed only surfaced.

One of the nuclear submarines of the ECHO-II Class built after 1965 with 7 SHADDOCK start tubes in the upper deck superstructure. The missiles are intended for ship targets, particularly for American carriers.

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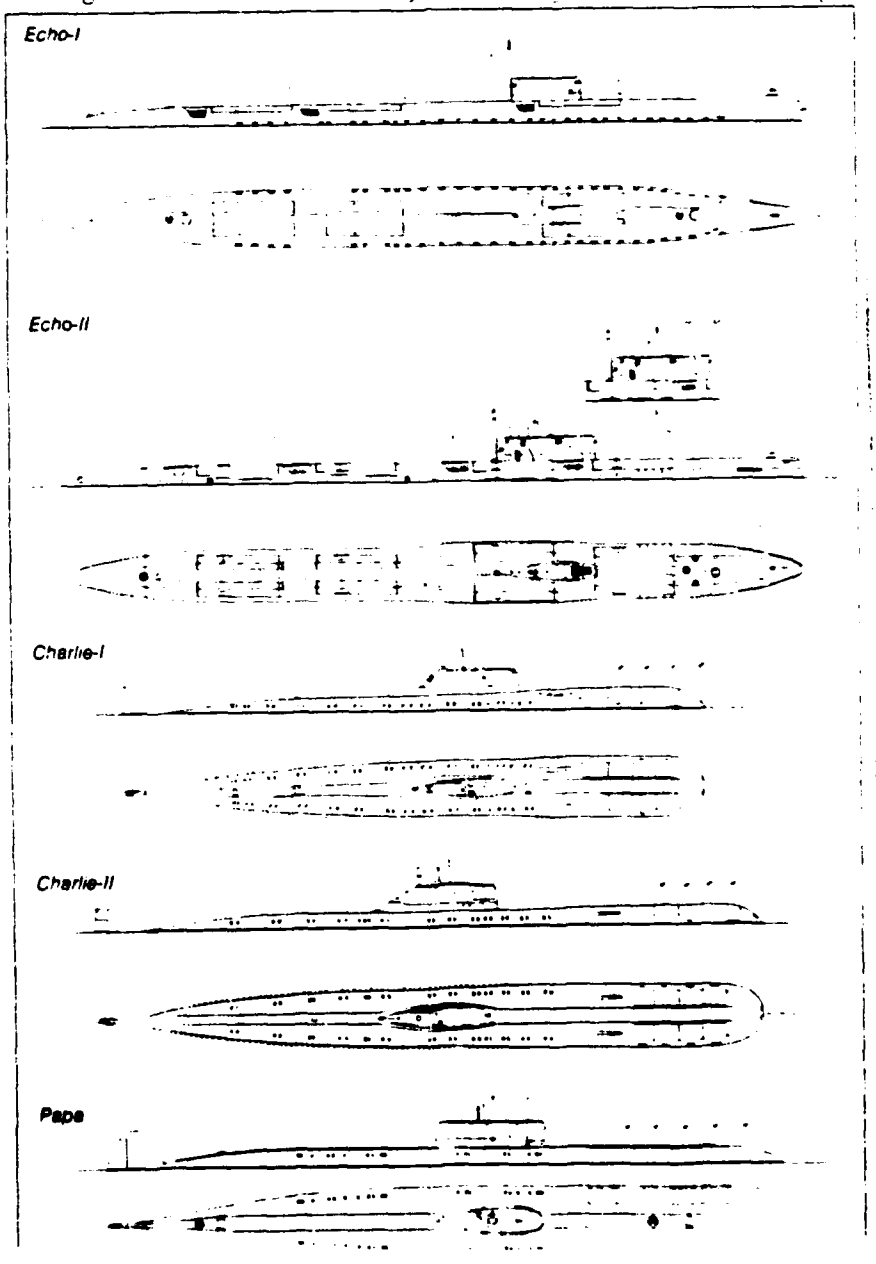
Delivery of these units began in 1962 and ended six years later, /41
at a time, when the termination of this program had already been implemented - in the original program 72 units were projected. A total of 16 of these units was completed. The fact that the program was terminated was probably due to the reactor technology, which had made progress, because with the ECHO II Class, which was authorized for construction only a little after the JULIETT Class - the ECHO-II Class was built at the Severdodvinsk shipyard - the construction of nuclear powered guided missile submarines entered a new stage. In this regard the enlargement of the hull made possible a 25-percent increase in the missile armament, so that eight containers could be installed, exactly on the patterns of the ECHO-I and JULIETT Classes. Each of these two containers could be elevated by approximately 15 degrees; no flaps or covers had to be operated for this purpose, as has since been generally assumed, but the container groups are elevated together with the parts of the outer hull surrounding them. The groove-type separating points could be observed on sufficiently sharp photos. The guide grooves of the individual containers installed there could also be noted on both sides of the sail (tower) in these photos.

The ECHO-II units also had the FRONT DOOR/FRONT PIECE fire control radar installed, and the sail (tower) also had to be turned towards the front to operate them, just as on the JULIETT Class. The operational restrictions for the missile are otherwise the same as on the JULIETT Class (up to 15 kn speed, up to sea state 6). A total of 29 units of this Class was built; their delivery began in 1964 and was terminated in 1968. In the interim a few units have been converted - 6 by the middle of 1983 - to the SS-N-12 (SANDBOX) missile weapon system. The considerably higher velocity of this missile probably gives its carrier several advantages: Certainly the missile can be launched only with the submarine surfaced, but after missile launch the submarine can submerge sooner than is possible with the SS-N-3A. This reduces the exposure time of the submarine. The external characteristic of these converted units - which are listed in NATO as ECHO-II MOD Class - are bulge-type protrusions on both sides of the sail and on the front of each of the individual missile containers in the sail area. It cannot be definitely stated whether or not other units have been converted to the SS-N-12 missile weapon system, but it would not be unlikely. However, it should also be considered with the ECHO-II units that they have been in service for up to 20 years, which must have had some effects upon their material condition, particularly with the oldest units. Therefore a conversion - as in any such case - would depend upon the evaluation of the total condition of each individual unit, and in this regard it could be imagined that some units were regarded as not being worth converting and stripped of their original missile armament could have been used as normal attack submarines.

SUBMARINE MISSILES FOR UNDERWATER LAUNCHING

In 1963 approximately at the same time the development of a new submarine-launched missile and the design studies for a new type submarine as its carrier were initiated. This new weapon system was the SS-7, which was also an aerodymamic missile, but in the subsonic/transonic limit range, which could carry either a conventional or nuclear warhead. The feature which really predestines this system for installation in submarines is it capability of being launched with the submarine submerge: After ejection with compressed air the rocket motor

is ignited when the missile clears the surface pf the water, while /42(
at the same time the autopilot and the integrated active radar begin to operate. As soon as a target is detected, the system is switched to automatic target tracking. The dimensions of the SS-N-7 are very well configured: With 7.6 m length and only 0.8 m cell diameter they correspond approximately to torpedoes. Therefore their launch containers can be made correspondingly small, so that their accommodation does not appear to have caused any serious problems. The new submarine type designed for this missile was begun in 1966 at the Krasnoye Sormovo Shipyard in Gorki, and delivery began in 1968. In NATO it was first assigned the codename CHARLIE; later it was redesignated CHARLIE-I after an improved variant was identified. By 1972 a total of eleven units were built. An hydrodynamically better hull form, the so called tear-drop hull, was used for this submarine. The missile containers were integrated into the foreship, where they are arranged behind each other on both sides and are installed in a fixed positioning angle of approximately 35 to 40 degrees in such a manner, that they fire to the right front.



This position makes the very full form of the foreship very understandable. Each of the start containers fires out of a port of the outer hull, which is kept closed by a folding or sliding cover. The front hydroplanes are necessary installed behind the the SS-N-7 system, immediately in front of the sail (tower). The SS-N-7 can be fired from a submerged depth of from 18 to a maximum of 36 meters, and the submarine can move at 12 kn during firing. To date it is still not determined whether these units in addition to their reactor-powered single-shaft propulsion system also have an auxiliary propulsion system - diesel motors. In the past this has been reported rather frequently, but recently not any more; this does now however mean that this question has been definitively resolved.

The nuclear powered submarines of the CHARLIE Class, whose SS-N-7 and later SS-N-9 missiles could be launched submerged, because of which the probability of premature detection of the attacking submarine could be considerably reduced, meant a considerable improvement of the tactical capabilities in anti-carrier operation. Photo:Archiv BIS

One of the few photos of the PAPA Class SSGN. The flaps on both sides in the foreship for the missile containers are so flush with the outer hull that they can hardly be noticed. Photo:Sammlung Breyer

In 1969 apparently on the design basis of the CHARLIE-I Class another type of SSGN was begun, which is designated in NATO as the PAPA Class. Delivery began in 1971, but there was only a single representative of this Class. Its building yard cannot be determined; some sources cite Krasnoye Sormovo shipyard in Gorki, others Shipyard 402 in Severodvinsk. Whereas this submarine was initially regarded as the prototype of a Class which was not released for series production for unknown reasons, recently the opion has been that this appears to be a trials ship which was intended exclusively for testing a new missile weapon system.

It was learned rather recently that the surface-to-surface SS-N-9 missiles which were installed on the NANUCKA Class frigate for the first time have been further developed for submarine installation. These are aerodymamic missiles in the subsonic/transonic velocity range. Their improvements as compared to the SS-N-7 appear to be essentially a greater range, but for this larger external dimensions and a higher start weight have to be accepted. The submarine-launched SS-N-9 - like the SS-N-7 - is reported to have an automatic control system, active radar and a homing head (seeker), which probably reacts to IR-emissions. /421

As differentiated from the CHARLIE-I Class, the PAPA Class has ten missile launching shafts and otherwise the configuration is the same. It appears that the foreward hydroplanes in it are also installed between the rear SS-N-9 port and the sail (tower), but they probably cannot be turned aside as usually, but can be withdrawn laterally. In any event, the size of the cover plates suggests this, which can be noted in this area.

From about 1972 the construction of an improved CHARLIE series began; this was assigned the NATO code designation CHARLIE-II. As compared to it predecessors its displacement increased by 400/500 tons, the length by 9 meters. These units were indeed presumably designed for the SS-N-9 missile, but first occasionally they appear to have first received the SS-N-7 and were then retrofitted with the SS-N-9 at a later date. The enlargement of this class cannot however be attributed to the larger- sized SS-N-9 alone, but as well to the fact that instead of torpedoes SS-N-15 missiles can carried aboard.

Externally the CHARLIE-II units are almost completely identical with the CHARLIE-I Class. There is however one feature by which they can be positively distinguished: In the CHARLIE-II the foreward hydroplanes (diving rudders) have their positions considerably further foreward, not as close to the tower (sail) as is the case in the CHARLIE-I.

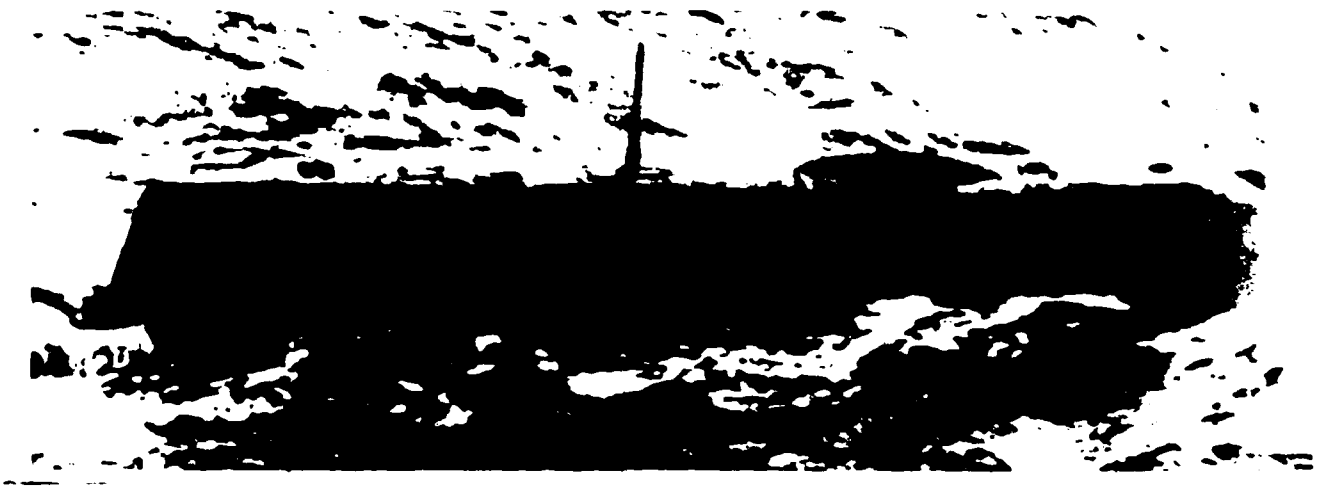
A total of only six units appear ro have been built; delivery began in 1973 and was completed probably in 1980 or 1981.

THE NEW NUCLEAR SSGN OF THE OSCAR CLASS

In April 1980 the internation press reported the launching of the largest submarine in the world at that time at the Severodvinsk shipyard. The superlative attributed to this submarine derived however less from the external dimensions than from the volume. This can be noted in the extraordinary L/B-ratio of approximately 0.8. This is a ratio which was exceeded only during WWII by a German submarine (Type XIV) - a supply submarine not equipped for combat operations, in which the L/B-ratio was 7.1, whereas it is usually between 10.0 and 12.0 and today goes up to almost 13.0 The fact that this new construction - designated as OSCAR in the NATO nomenclature - has such a full hull form is to an extent dictated in the nature of its mission: It is designed as a carrier of long-range surface-to-surface missiles and insofar is a development, which could be reached by a quantum jump and not by the continuity of a gradual progression. This is very apparent on the basis of the development illustrated here.

The item with which the OSCAR Class is differentiated in a very special way from its predecessors is its missile weapon system: This is the SS-N-19, the system which was installed for the first time on the nuclear guided missile cruiser KIROV, and which is now available

apparently in modified form, i.e., for submerged launching. In regard to the range it should be assumed that it corresponds to the version installed in the KIROV, approximately sm. The OSCAR's have twenty-four SS-N-19 on board, four more than the KIROV. These are carried in storage and launch shafts which are inserted between the pressure hull and the outer hull, which makes their pressurized design necessary. On the basis of the external indications two shafts are each combined to a pair, for which in the outer hull one common opening is provided, which closed by a sliding cover towards the outside. This assumption derives from the fact that on each side of hull there are six such openings. With a length of ca, 6.5 meters and a width of some 2 meters, they appear large enough to accomodate two shaft(tube) openings each. Very probably the shafts are as in the KIROV Class are angled obliquely forewards; the positioning angle is estimated at approximately 40 degrees.



The first photo of an SSGN of the OSCAR Class was published in the Pentagon Paper "Soviet Military Power" in the Spring of 1985. It shows the sail (tower) of such an SSGN, which was apparently photographed just as it was submerging. In the front half the slightly convex folding cover can be noted. which apparently closes a shaft, in which either a fire control radar or very likely a short-range anti-helicopter is contained.

In addition to its surface-to-surface missile system the OSCAR Class has a torpedo armament. According to Jane's Fighting Ships 1985-86 there are eight torpedo tubes (Combat Fleets 1982 states that they are located in the bow) and 24 reserve torpedoes, so that a total of 32 torpedoes would be available. Probably SS-N-15 ASW torpedoes can be fired from all torpedo tubes (or from some tubes specially adapted); the SS-N-15 is regarded as the Soviet counterpart of the American SUBROC.

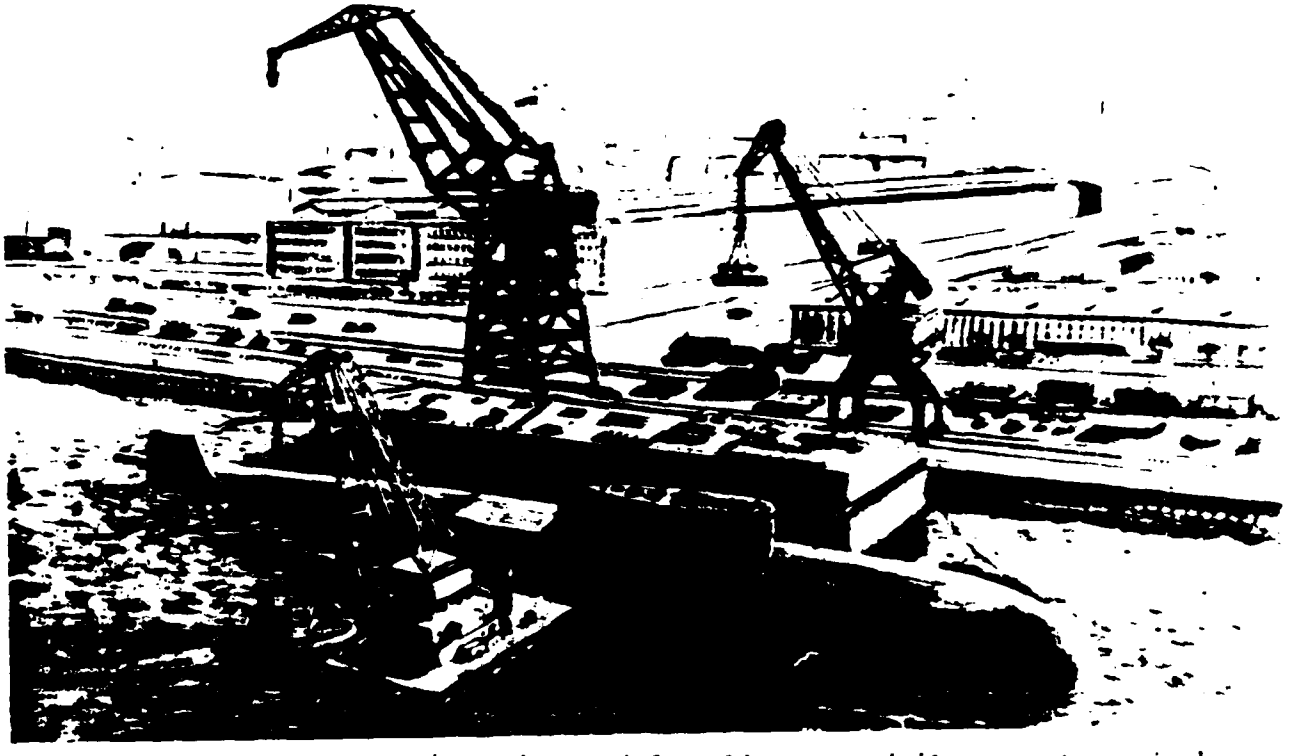
The sail (tower), which is approximately 27 meters longs and with 6 meters height is unusually tall appears to contain a vertical shaft in its foreward half; the corresponding characteristic for this is a slightly convex - therefore apparently pressurized - hinged cover. Either in this shaft a telescopingradar antenna - possibly a fire control radar assigned to the SS-N-19 - can be contained, or there might be a telescopic-type mobile surface-to-air missile system something like the British SLAM system*; the introduction of such a system is

* SLAM = Submarine Launched Air Missile. This is used for defense against low-level and slow aircraft, particularly ASW-helicopters and uses a "BLOWPIPE" which has a range of ca. 3,000 meters. The telescoping launcher holds six "BLOWPIPES".

reported to have begun recently in Soviet submarines. It can b[illegible] /-/
assumed from the evaluation possible from the currently very mi[illegible]
photo documentation that behind this there is a second rather lar[illegible]
device installed, but this cannot to date be definitely establi[illegible].
A just 1-meter high tower deck step connects to the tower (sail), w[illegible]
in a certain sense appears to be similar tp the "missile saddle" [illegible]
nuclear SSBN, but it is considerably flatter than in the SSB[illegible]. I[illegible]
this there is presumably a towed device contained, either a VLF-[illegible]
buoy or an ELF-towed antenna, or both*. Probably this devic[illegible]

* VLF = Very Low Frequency; ELF = Extreme Low Frequency.

by opening a horizontal cover, as is the case in other new Soviet submarine types.



The secret Soviet Shipyard 402 would appear similar to the artist's impression above; this is the current construction center for large Soviet submarines. This artist's impression was published in the Pentagon paper "Soviet Military Power". Here a an SSGN of the OSCAR Class is in final fitting out.

Astern the vertical fin of the rudder cross which is characteristic for the tear-drop form of modern submarines. The rear termination is a stern form, which is the English terminology is variously designated as the "Hoegner stern"; apparently with this the double tail fin behind the rudder cross is meant, from the end of which the propeller shafts protrude. The latest edition of Jane's Fighting Ships reports in regard to the propulsion system that it consists of two geared turbines powered by two nuclear reactors with a power of 60,000 HP (44,150 kW), with which a submerged speed of up to 35 kn can be reached.

Submarine Missile Systems of The Soviet Navy

		SS-N3-A	SS-N-3C	SS-N-7	SS-N-9	SS-N-12	SS-N-19
Year of introduction		1963	1961	1967	1969	1975	1980
Start weight	kg	4.7	4.5	2.5	3.2-3.5	5.0	ca. 6.0
Length	m	10.9	10.9	7.9	9.1	12.5	ca. 13.(
Cell diameter	m	0.9	0.9	0.7	0.8	0.9	ca. 1.(
Wingspan in flight	m	2.6	2.6	2.5	2.4	2.6	-
Engines	number	1	1	1	1	1	1
Type engines		turbojet	turbojet	SOLID FUEL ROCKET	turbojet	turbojet	turbojet
Auxiliary rockets		2	2	1	2	2	2
Velocity	Mach	0.85-1.3	0.85	0.9	0.9-1.2	2.5	over 2.5
Max. range	sm	250	250	35	60	300?	300
Effective range	sm	18	30-50	-	30	30	30?
Warhead							
conventional	kg	900	900	500	500	900	1,000?
nuclear	KT	350	800	200	200	350	350?

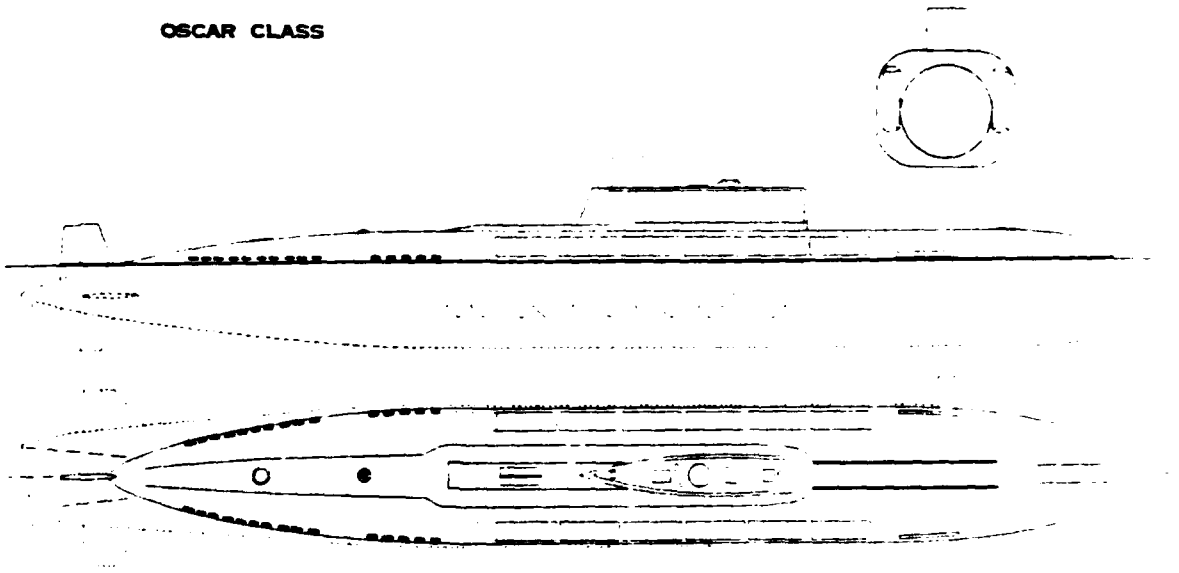
Respectively 25% of the SS-N-3/SN-N-12 missiles carried per unit are reported to be equipped with a nuclear warhead (Vego, Their SSG's/SSGN)- in Proceedings No. 10/82).

The Soviet SSGN

Hull No.	Shipyard	Building Period	History, Status
WHISKEY SINGLE CYLINDER Class			
1	Black Sea Region (Sevastopol?)	1956-57	Conversion from WHISKEY Class; no longer in service
WHISKEY TWIN CYLONDER Class			
1-6	Naval Arsenal Rosta	1958-60/61	Conversion from WHISKEY Class; two units still in service
WHISKEY LONG BIN Class			
1-2	Baltic Yard Leningrad	1959-61	Probably modifications of
3-4	Baltic Yard Leningrad	1960-62	incomplete WHISKEY hulls;
5-6	Baltic Yard Leningrad	1961-63	3 units still in service
7	Baltic Yard Leningrad	1962-64	
JULIETT Class			
1-3	Krasnoye-Sormovo Shipyard, Gorki	1961-62	New constructions
4-6	Krasnoye-Sormovo Shipyard, Gorki	1962-63	New constructions
7-8	Krasnoye-Sormovo Shipyard, Gorki	1963-64	New constructions
9-10	Krasnoye-Sormovo Shipyard, Gorki	1964-65	New constructions
11-12	Krasnoye-Somorvo Shipyard, Gorki	1965-66	New constructions
13-14	Krasnoye-Somorvo Shipyard, Gorki	1966-67	New Constructions
15-16	Krasnoye-Somorvo Shipyard, Gorki	1967-68	New Constructions
ECHO-I Class			
1	Amur Shipyard, Komsomolsk	1960-61	New constructions; all
2-3	Amur Shipyard, Komsomolsk	1961-62	converted to SSN at the
4-5	Amur Shipyard, Komsomolsk	1962-63	beginning of the 1970's
ECHO-II Class			
1-5		1961-63	New constructions Ca. five
6-10		1962-64	New constructions units
11-16	Shipyard 402, Severodvinsk, and	1963-65	New constructions converted
17-21	Amur Shipyard, Komsomolsk	1966-67	New Constructions to ECHO-II
22-25		1966-67	New constructions MOD Class
26-29		1967-68	New constructions

CHARLIE-I Class			
1-2	Krasnoye-Somorvo Shipyard, Gorki	1967-68	New Constructions
3-4	Krasnoye-Somorvo Shipyard, Gorki	1968-69	New Constructions
5-7	Krasnoye-Somorvo Shipyard, Gorki	1969-70	New Constructions
8-10	Krasnoye-Somorvo Shipyard, Gorki	1970-71	New Constructions
11	Krasnoye-Somorvo Shipyard, Gorki	1971-72	New Construction
PAPA Class			
1	Shipyard 4/2, Severodvinsk (Krasnoye-Somorvo Shipyard, Gorki?)	1969-71	New Construction
CHARLIE-II Class			
1	Krasnoye-Somorvo Shipyard, Gorki	1972-73	New construction
2	Krasnoye-Somorvo Shipyard, Gorki	1973-74	New construction
3	Krasnoye-Somorvo Shipyard, Gorki	1975-77	New construction
4	Krasnoye-Somorvo Shipyard, Gorki	1976-79	New construction
5	Krasnoye Somorvo Shipyard, Gorki	1978-80	New construction
6	Krasnoye-Somorvo Shipyard, Gorki	1979-81	New Construction
OSCAR Class			
1	Shipyard 402, Severodvinsk	1978-81	New construction
2	Shipyard 402, Severodvinsk	1979-83	New construction
3	(?)		

OSCAR CLASS



If - as first reported in Jane/s Fighting Ships 1982/83 - there is a rather large interval (it is stated there as being between 1.8 to 2.1 m) between pressure hull and outer hull, then this is doubtless caused by the configuration of the missile tubes outside of the pressure hull; its diameter can be estimated roughly at approximately 10 meters.

The keel of the first OSCAR submarine was laid in 1978; it was launched in April 1980, started its trials in 1981 and was commissioned presumably in the second half of 1982. A second unit was apparently launched in 1982 and is now fitting out. This was reported at the time by several Norwegian sources and the new edition of the Pentagon Paper*

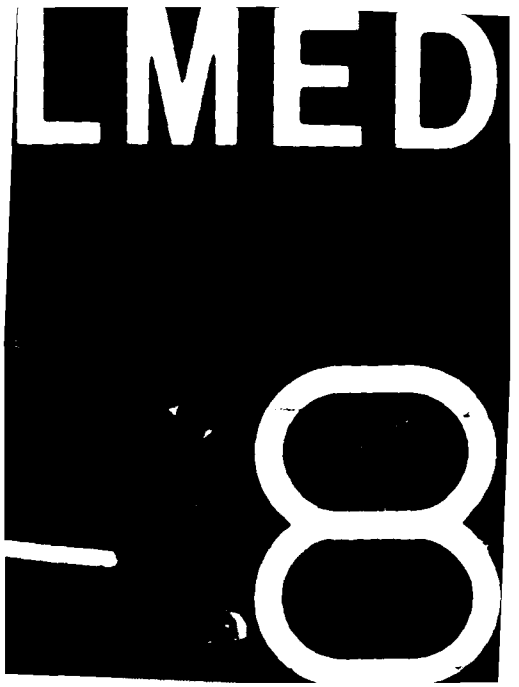
* Soviet Military Power, Second Edition, p. 71.

assumes the presence of a second unit. It can be assumed that additional units of the OSCAR Class will be built. It is possible that a third unit is being built in one of the covered building docks at Severodvinsk, which is protected again satellite observation. /42

Without any doubt the OSCAR Class is a new threat which should be taken seriously. It is directed primarily against the feared American carrier battle groups, and secondarily large container ships, super tankers, troop transports and other high-value civilian ships would be considered as appropriate missile targets. The size of the OSCAR Class submarine and the missile capability, which is three times as great as previous Soviet SSGN, makes it possible for them to operate at far greater ranges and with considerably less dependence upon bases. In addition, their SS-N-19 missiles have a far greater range. These missiles - which are possibly controlled by SOSS-surveillance satellites* -

* SOSS = Soviet Ocean Surveillance System.

have a range of up to 300 sm and reach a considerably higher velocity than the anti-ship missiles which were in use previously, so that the ship under attack has a considerably shorter warning and reaction time. It would therefore appear that in addition to its high tactical value the OSCAR total weapons system assumes a certain degree of strategic importance. It is expected from the American side that the Sovier naval command assigns a very high priority to this OSCAR Class and will use one or two modern SSN to protect it. Their mission would be to engage or drive off attacking submarines. The capabilities for world-wide oceanic operations as illustrated should make it apparent that this Class is only one of several elements of which the currently developing new Soviet Fleet consists and which all have long-term oceanic operation as their basic predication.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